

DECLARATION

I, Tsutomu FUKUI of Hatoyama-cho Hikigun, Saitama prefecture, Japan hereby declare that I have knowledge of the Japanese and English languages and that the writing contained in the following pages is believed to be a correct translation of the Japanese Patent Application No. 304084/2002 entitled:

FIXING APPARATUS

Declared in Tokyo, Japan

On this 19th day of December, 2005

A handwritten signature in cursive script, reading "Tsutomu Fukui", written over a horizontal line.

Tsutomu FUKUI



[NAME OF DOCUMENT]

SPECIFICATION

[TITLE OF THE INVENTION]

FIXING APPARATUS

[SCOPE OF PATENT CLAIMS]

(Claim 1) A fixing apparatus, characterized in that, in the fixing apparatus for fixing a toner image onto a paper by pressing the paper, on which the toner image is transferred, by means of a pressing roller, and at a same time, by applying heat to the paper by means of a heating roller, the fixing apparatus is provided with: a temperature detecting element to detect a temperature of the heating roller; a support member to support the temperature detecting element; and a cleaning member disposed at a position upstream from the temperature detecting element in a rotating direction of the heating roller on the support member.

(Claim 2) The fixing apparatus described in claim 1, characterized in that the cleaning member is a felt.

[DETAILED DESCRIPTION OF THE INVENTION]

[0001]

[BACKGROUND OF THE INVENTION]

The present invention relates to a fixing apparatus utilized for a facsimile apparatus, which employs a contact transferring method, a copier, etc.

[0002]

[PRIOR ART]

Generally speaking, the facsimile apparatus, which employs a contact transferring method, or the copier employs the steps of: forming a electrostatic latent image on a photoreceptor drum, based on image data of an original document; absorbing toner into the electrostatic latent image formed on the photoreceptor drum; transferring the toner image onto the paper; and fixing the toner image onto the paper by applying heat and pressure to the paper with the toner image by means of the fixing apparatus including a pressing roller and a heating roller.

[0003]

To detect temperature of the heating roller, a thermistor is equipped in the fixing apparatus, which includes the pressing roller and the heating roller. For instance, as shown in Fig. 5, the thermistor 30 is mounted in such a manner that the thermistor 30 contacts substantially a center portion of a surface of the heating roller 40. The thermistor 30 is constituted by a heat resistant sheet 32, which is extended from a main body 31 fixed onto a main frame of the facsimile apparatus or the copier and contacts the surface of the heating roller 40, and a thermistor element 33 disposed opposite to (obverse side) the contact point of the

heat resistant sheet 32 against the heating roller 40. The thermistor element 33 detects the temperature of the heating roller 40 through the heat resistant sheet 32.

[0004]

[SUBJECT TO BE SOLVED BY THE INVENTION]

However, since the center portion of the heating roller 40 is also a printing portion, residual toner 50, attached onto the heating roller 40, pass through a gap between the heat resistant sheet 32 and the heating roller 40, and firmly stick on the surface of the heat resistant sheet 32. As a result, sometimes, due to the existence of the stuck toner, the detected temperature detected by the thermistor 30 (thermistor element 33) is lower than the actual temperature of the heating roller 40.

[0005]

Accordingly, since the thermistor 30 detects the temperature of the heating roller 40 at a value lower than the fixing temperature, despite that the temperature of the heating roller 40 already reaches to the predetermined fixing temperature, the heating roller 40 is further heated up by means of the heat source, such as halogen lamp, etc., so as to rise the temperature up to the fixing temperature. As a result, the temperature of the heating roller 40 excessively rises to an unnecessary high temperature, and accordingly,

the toner image transferred onto the paper moves onto the heating roller 40, resulting in an occurrence of the offset phenomenon, so to speak. It has been a problem that, due to such the offset phenomenon, it becomes impossible to sufficiently fix the toner image onto the paper, resulting in a deterioration of the printing quality.

[0006]

The present invention is achieved in view of the abovementioned problems, and the object of the present invention is to provide a fixing apparatus, which makes it possible to accurately detect the temperature of the heating roller as a real temperature.

[0007]

[MEANS FOR SOLVING THE SUBJECT]

To achieve the abovementioned object, a fixing apparatus of the present invention is characterized in that, in the fixing apparatus for fixing a toner image onto a paper by pressing the paper, on which the toner image is transferred, by means of a pressing roller, and at a same time, by applying heat to the paper by means of a heating roller, the fixing apparatus is provided with: a temperature detecting element to detect a temperature of the heating roller; a support member to support the temperature detecting element; and a cleaning member disposed at a position

upstream from the temperature detecting element in a rotating direction of the heating roller on the support member.

[0008]

In this fixing apparatus, since the cleaning member is disposed at a position upstream from the temperature detecting element on the support member, even if residual toner attached to the heating roller move towards the temperature detecting element associating with the rotation of the heating roller, the residual toner are removed by the cleaning member, and therefore, do not come into a gap between the support member, which supports the temperature detecting element, and the heating roller. Accordingly, the defect that the toner adheres onto the thermistor does not occur, and it is possible for the thermistor to accurately detect the temperature of the heating roller. According to the above, the case that the heating roller is heated up to a temperature higher than the fixing temperature is eliminated, and the offset does not occur, and therefore, it is possible to solve the problem of the deterioration of the printing quality.

[0009]

Incidentally, as far as the residual toner can be surely removed, the cleaning member is not limited to a specific one. For instance, the felt would be preferable.

[0010]

[EMBODIMENT OF THE INVENTION]

According to the embodiment, the present invention will be further detailed in the following.

[0011]

Fig. 1 shows a cross sectional schematic diagram of a main part of a printing section of the image forming apparatus (the facsimile apparatus, the copier or a compound apparatus of such the apparatuses) provided with the fixing apparatus embodied in the present invention. The configuration of the printing section of the image forming apparatus is briefly described as follow. The paper fed from a paper feeding cassette 10 in which papers are set is conveyed to a transferring section and a fixing section along a paper conveying path P (indicated by one dotted chain line). The paper in the paper feeding cassette 10 is taken out one by one by a pickup roller 11 and conveyed to the transferring section through a pair of conveyance rollers 12 and a pair of conveyance rollers 13.

[0012]

A toner container 20 containing toner, a feeding roller 21 and a developing roller 22 are disposed at the developing section of the printing section. The feeding roller 21 supplies toner to the developing roller 22, while

electrically charging the toner. The developing roller 22 further supplies the toner fed from the feeding roller 21 to a photoreceptor drum 23.

[0013]

The photoreceptor drum 23, having a photo-conductive film coated on its outer circumferential surface, is disposed at the transferring section, and is rotated by the driving source (not shown in the drawings). A transferring roller 24 disposed opposite to the photoreceptor drum 23 is arranged in such a manner that the transferring roller 24 contacts the outer circumferential surface of the photoreceptor drum 23, while putting the paper conveying path P between them, and is rotated by the driving source (not shown in the drawings). Further, a charging brush 25, serving as a charger of the brush roller method, is disposed in the periphery of the photoreceptor drum 23, so that the charging brush 25 uniformly charges the outer circumferential surface of the photoreceptor drum 23, while rotating.

[0014]

A printing head 26, serving as an exposing section, is disposed in the periphery of the photoreceptor drum 23, is constituted by arraying many LEDs (light emitting diodes) in parallel, so that the printing head 26 irradiates light onto the outer circumferential surface of the photoreceptor drum

23 on the basis of the inputted image information so as to form an electrostatic latent image corresponding to the image information. Further, a memory removing blush 27 is disposed in the periphery of the photoreceptor drum 23. A role of the memory removing blush 27 is to disperse the toner image (a memory image) still remaining along the contours of the image on the outer circumferential surface of the photoreceptor drum 23 after the transferring operation is completed.

[0015]

The fixing section (fixing apparatus) is constituted by the heating roller 40, a pressing roller 41, the thermistor 30, etc. A heater of the heating roller 40 (for instance, a halogen lamp) is heated up to a predetermined temperature by a heater driving circuit (not shown in the drawings). The heating roller 40 and the pressing roller 41 applies heat and pressure onto the toner image transferred on the paper so as to fix the toner image on the paper. The thermistor 30, serving as a temperature detecting element, detects the temperature of the heating roller 40, and then, the detected signal of the thermistor 30 is inputted into the heater driving circuit, so that the heater driving circuit can control the heater of the heating roller 40 based on the detected signal.

[0016]

The paper, on which the toner image is fixed by means of the fixing apparatus, is conveyed by a pair of conveying rollers 15, and ejected onto an ejecting tray (not shown in the drawings).

[0017]

The fixing apparatus, being a feature of the image forming apparatus, is constituted by the heating roller 40, the pressing roller 41, the thermistor 30, etc., while the thermistor 30 has such a configuration indicated in Fig. 2 (a simplified side view) and Fig. 3 (a plan view of the thermistor). Concretely speaking, the thermistor 30 is provided with the heat resistant sheet 32 (support member) that is extended from the main body 31 fixed onto the main frame of the image forming apparatus so as to contact the surface of the heating roller 40, the thermistor element 33 disposed opposite to (obverse side) the contact point of the heat resistant sheet 32 against the heating roller 40, and a felt 34 (cleaning member) disposed upstream from the thermistor element 33 in the rotating direction of the heating roller 40.

[0018]

The heat resistant sheet 32 has an appropriate elasticity, and the thermistor element 33 is adhered onto the obverse side of the heat resistant sheet 32, and further, an

reverse side portion of the thermistor element 33 just opposite the thermistor element 33 contacts the surface of the heating roller 40. Since the heat resistant sheet 32 has the appropriate elasticity, the contacting state between the felt 34 and the heating roller 40 is maintained.

[0019]

Although the printing operation, in the image forming apparatus having the configuration mentioned in the above, is well known, the brief description for the printing operation is provided as follow. The printing operation includes the steps of: uniformly charging the photoreceptor drum 23 by means of the charging blush 25; forming an electrostatic latent image (reverse developing) corresponding to the image information onto the charged photoreceptor drum 23 by means of the LED printing head 26; absorbing toner into the electrostatic latent image formed on the photoreceptor drum 23 by means of the developing roller 22 to form the toner image on the photoreceptor drum 23; transferring the toner image on the photoreceptor drum 23 onto the paper by means of the transferring roller 24; and applying heat and pressure onto the paper so as to fix the toner image on the paper as a permanent image.

[0020]

During the fixing operation, the heating roller 40 and the pressing roller 41 rotate in directions respectively indicated by the arrows shown in Fig. 2. In the enlarged view shown in Fig. 4, although the toner 50, attached to the heating roller 40 from the paper, moves towards the thermistor element 33 associating with the rotation, the felt 34, located upstream from the thermistor element 33, catches the toner 50 so that the toner 50 cannot enter into a gap between the thermistor element 33 (reverse side of the heat resistant sheet 32) and the heating roller 40. Accordingly, it is possible for the thermistor 30 to accurately detect the temperature of the heating roller 40 as a real temperature. Therefore, the problem of the deterioration of the printing quality due to the non-fixed toner image onto the paper is solved without occurring the offset.

[0021]

Incidentally, although the thermistor 30 is disposed at substantially a center portion of the heating roller 40, it is also applicable that the thermistor 30 is disposed at the end portion, without restricting to the above.

[0022]

Further, other than the thermistor, a thermo-couple, a platinum resistance thermometer sensor, etc. can be also employed as the temperature detecting element. Still further,

the cleaning member is not limited to the felt, but a sponge, a blush, a textile, etc. are also employable as the cleaning member.

[0023]

[EFFECT OF THE INVENTION]

As explained in the foregoing, according to the fixing apparatus of the present invention, since the cleaning member is disposed at a position upstream from the temperature detecting element on the support member, even if residual toner attached to the heating roller move towards the temperature detecting element associating with the rotation of the heating roller, the residual toner are removed by the cleaning member, and therefore, do not come into a gap between the support member, which supports the temperature detecting element, and the heating roller. Accordingly, the defect that the toner adheres onto the thermistor does not occur, and it is possible for the thermistor to accurately detect the temperature of the heating roller. According to the above, the case that the heating roller is heated up to a temperature higher than the fixing temperature is eliminated, and the offset does not occur, and therefore, it is possible to solve the problem of the deterioration of the printing quality.

[BRIEF DESCRIPTION OF THE DRAWINGS]

Fig. 1 shows a cross sectional schematic diagram of a main part of a printing section of the image forming apparatus provided with a fixing apparatus embodied in the present invention.

Fig. 2 shows a simplified side view of a fixing apparatus of the same image forming apparatus.

Fig. 3 shows a plain view of a thermistor in a fixing apparatus of the same image forming apparatus.

Fig. 4 shows a drawing for explaining an operation of a thermistor in a fixing apparatus of the same image forming apparatus.

Fig. 5 shows a drawing for explaining an operation of a thermistor in a fixing apparatus as a conventional example.

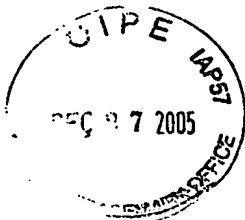
[EXPLANATION OF NOTATION]

- 10 a paper feeding cassette
- 20 a toner container
- 23 a photoreceptor drum
- 24 a transferring roller
- 30 a thermistor
- 31 a main body
- 32 a heat resistant sheet
- 33 a thermistor element
- 34 a felt
- 40 a heating roller

41 a pressing roller

50 toner

P a paper conveying path



[NAME OF DOCUMENT] ABSTRACT

[ABSTRACT]

[SUBJECT] The subject is to provide a fixing apparatus, which is makes it possible to accurately detect temperature of the heating roller as a real temperature.

[MEANS FOR SOLVING THE SUBJECT] The fixing apparatus is constituted by the heating roller 40, the pressing roller 41, the thermistor 30, etc. The thermistor 30 is provided with the heat resistant sheet 32 that is extended from the main body 31 fixed onto the main frame of the image forming apparatus so as to contact the surface of the heating roller 40, the thermistor element 33 disposed opposite to the contact point of the heat resistant sheet 32 against the heating roller 40, and a felt 34 disposed upstream from the thermistor element 33 in the rotating direction of the heating roller 40. According to the above, the case that the heating roller is heated up to a temperature higher than the fixing temperature is eliminated, and the offset does not occur, and therefore, it is possible to solve the problem of the deterioration of the printing quality.

[SELECTION OF DRAWINGS] Fig. 2